

D3 CLAIM 37 (amended)

- 1 An apparatus comprising:
- 2 a solution containing protonated anthracene; and
- 3 an acrylamide gel disposed in said solution.

- 1 Cancel Claim 38.

### Remarks

In response to the Office Action of 2 July 2002, Applicant hereby respectfully requests reconsideration and reexamination of the above-identified application.

In the above-cited Office Action, all of pending claims 7-13 and 27-38 were rejected. By this amendment, claims 7, 34 and 37 have been amended. Claims 36 and 38 have been canceled. Claims 7-13, 27-35 and 37 remain in the application.

Applicant has appealed the present case. In light of this appeal, the Examiner has provided new ground(s) of rejection and has reopened prosecution. To answer the new ground(s) of rejection, Applicant has chosen to reply thereto.

### Patent Office Claim Objections

The Examiner states that claim 37 has been misnumbered and that this claim has been renumbered as claim 34.

### Applicant's Response to Claim Objection

Applicant hereby ratifies the renumbering of claim 37 (first occurrence) to claim number 34.

**Patent Office Rejection of Claims 7-13 and 27-38 under 35 USC 103(a) over Zirino/Kane**

Regarding claim 7, the Examiner states that Zirino contains all of the claimed elements but the use of anthracene. The Examiner asserts that Kane teaches the use of anthracene as a dye in a pH sensitive polyacrylic membrane. The Examiner states that it would have been obvious to include anthracene in the solution of Zirino because Zirino teaches that a number of pH dependent dyes would be chosen dependent upon selective light and powering.

Regarding claims 8-13, the Examiner asserts that Zirino teaches all of the additional claim limitations.

With regard to claim 27, The Examiner states that Zirino is silent with respect to use of protonated anthracene. The Examiner states that "since the null point pH value of the polyelectrolyte fiber is 5.3, the pH of the solution in the Zirino combination would be acidic because it is within plus or minus 1 pH of 5.3. Thus, anthracene in the solution of the Zirino combination would be in the protonated form, because it is acidic."

The rejection of the remaining claims, claims 28-38, are based upon the arguments as presented in the rejection of the earlier cited claims.

**Applicants' Response to the Patent Office Rejections under 35 USC 103 over Zirino/Kane**

In light of the amendments to the claims, Applicant traverses these rejections.

Claim 7 has been amended to read that irradiating the claimed solution containing anthracene with light results in "said light causing said anthracene to phosphoresce". Claims 8-33, by their dependencies, all contain this feature.

Independent claims 34 and 37 have each been amended to reflect that the anthracene used is in its protonated form. Claims dependent on these independent claims of course also contain this feature. Support for this change may be found in the specification at page 11, lines 1-4 and the claims as originally filed.

Addressing first the rejection of claim 7 and its accompanying dependent claims, all of these claims include a form of anthracene that phosphoresces when irradiated with the claimed light.

While it can be respected that Zirino has the foresight to envision that any of a variety of pH dependent dyes could be chosen for use with his invention, he did not have the foresight to appreciate or even discover the positive attributes of using anthracene with an expandable and contractible polymer as described and claimed by the Applicant.

The Examiner indicates that it would be obvious to one of ordinary skill in the art to select the anthracene of Kane to be used in Zirino.

Applicant must traverse this reasoning. Kane provides art that was available approximately 6 years prior to the issuance of Zirino. Zirino however ignored its teachings. Instead Zirino chooses one or more dyes whose excited states exist on the order of nanoseconds, versus the millisecond lifetimes available through Applicant's claimed dye. Zirino instead chooses one or more dyes having heat characteristics that will lengthen rather than shorten in time the desired contraction of a polymer.

If indeed Zirino had Kane available to promote his invention, why would he in fact select dyes of such negative characteristics and ignore the teachings of Kane? Applicant asserts that this is so because it was not, and is presently not obvious to take the teachings of Zirino and combine those with Kane.

Even if one were to study the teachings of Kane, one finds that Kane teaches the use of a form of anthracene that **flouresces** when exposed to light. This is precisely what Applicant desired to avoid.

Zirino appears to be totally oblivious to the shortcomings that flourescent state lifetimes have on the pH change promoted by his dyes. His invention shares the attributes of Campillo

described on page 6, lines 1-13 of Applicant's specification. Campillo's fluorescent radiative decay permits a pH change lifetime of approximately 10 nanoseconds. Applicant's dye allows excited states and hence pH changes to exist  $10^6$  times as long!

There is no teaching within Kane, or Zirino, for the use of anthracene that promotes a phosphorescent decay and hence extended pH change lifetime. Kane only describes using 9, 10 diphenyl anthracene that will fluoresce. See column 4, lines 20-36.

Applicant has amended claim 7 to read that the anthracene used phosphoresces upon the claimed light irradiation. Use of such anthracene is neither suggested or taught by the Zirino and Kane references, either individually or in unison, either expressly or implicitly.

As such, claim 7 and the claims dependent thereon all contain a feature Applicant asserts is not obvious or anticipated by the prior art. Removal of these rejections is therefore respectfully requested.

Regarding independent claims 34 and 37, and those dependent thereon, Applicant has amended these claims to describe the use of protonated anthracene.

The Examiner indicates that because in some circumstances Zirino will require an acidic solution into which a polymer will be inserted, use of anthracene will compel use of its protonated form, because the solution is acidic.

Applicant must traverse this reasoning.

While one may have an acidic solution of anthracene in which the anthracene is in its protonated form, it is entirely possible to have an acidic solution of anthracene wherein the anthracene is not in its protonated form. Thus one of ordinary skill in the art would not choose

the protonated form of anthracene merely to provide an acidic solution. This would be particularly true if they were to follow the teachings and suggestions of Kane, wherein Kane describes the use of 9, 10 diphenyl anthracene.

To choose the protonated form of anthracene over the fluorescing form of anthracene described by Kane, one would have to recognize the shortcomings of using a fluorescing anthracene in conjunction with an expandable and contractible polymer. There is absolutely no teaching within Zirino or Kane that recognizes this.

Because of the lack of teachings and / or suggestions in either Zirino or Kane, Applicant considers the 35 U.S.C. 103 rejection of the claims as amended to now be improper. Removal of these rejections is respectfully requested.

Serial No. 09/574,987; Navy Case No. 82408

Any inquiry concerning this case should be directed to Applicants' attorney, Mr. Peter Lipovsky at (619) 553-3824.

Respectfully submitted,

by

A handwritten signature in black ink, reading "Peter A. Lipovsky". The signature is written in a cursive style with a large, stylized "P" and "L".

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**37 CFR 1.121(b)(2) ATTACHMENT SHOWING CHANGES MADE**

**In the Claims:**

Please rewrite the claims as follows:

CLAIM 7 (amended)

1 An apparatus comprising:

2 a solution containing anthracene;

3 a polymer disposed in said solution, said polymer having the characteristic of changing its  
4 volume in response to a change in pH; and

5 a source of visible light for irradiating said solution with light of a wavelength and of an  
6 intensity to establish a pH change in said solution so that when said solution is irradiated with  
7 said visible light said polymer undergoes a change in volume, said light causing said anthracene  
8 to phosphoresce.

CLAIM 34 (amended)

1 An apparatus comprising:

2 a solution containing protonated anthracene; and

a polyelectrolyte fiber disposed in said solution.

CLAIM 37 (amended)

1 An apparatus comprising:

- 2 a solution containing protonated anthracene; and
- 3 a polyelectrolyte fiber disposed in said solution.